

Before the  
**FEDERAL COMMUNICATIONS COMMISSION**  
Washington, D.C. 20554

In the Matter of

Amendment of Parts 1, 2, 22, 24, 27, 90 and  
95 of the Commission's Rules to Improve  
Wireless Coverage Through the Use of Signal  
Boosters

WT Docket No. 10-4

**COMMENTS OF PUBLIC SAFETY LICENSEES**

The Metropolitan Washington Airports Authority ("MWAA"), the City of Cambridge, Massachusetts, the Maryland Counties of Anne Arundel and Montgomery, and the Virginia Counties of Arlington and Fairfax hereby respond to the captioned Notice of Proposed Rulemaking ("NPRM").<sup>1</sup> All are 800 MHz public safety radio licensees and all deploy one or more of the types of signal boosters discussed in the NPRM. Several have adopted ordinances or practices calling for adequate in-building signal levels to aid reliable public safety response.<sup>2</sup>

**License-by-Rule.** At ¶ 79 of the NPRM, the Commission asks "how to facilitate non-licensee use of Part 90 PLMR Class B signal boosters for in-building emergency communications, including whether we should adopt our proposed consumer signal booster license-by-rule approach."<sup>3</sup> We do not think license-by-rule is a prudent approach, at this time, to non-licensee use of Part 90 signal boosters. Signal boosters placed into operation by private

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<sup>1</sup> FCC 11-53, released April 6, 2011, WT Docket No. 10-4.

<sup>2</sup> Exhibit A hereto contains system and equipment information; as well as code citations.

<sup>3</sup> License-by-rule, as discussed at ¶¶ 29-32 of the NPRM, would make the private installer or user responsible for compliance of the new booster's operation, without need for consent of the licensee.

parties may create harmful interference to 800 MHz voice radio systems. Unless properly installed and maintained, bi-directional amplifiers (“BDAs”) can generate wideband RF noise that can cripple the inbound receive performance of 800 MHz voice radio systems, resulting in significant reduction of talk-in range for affected sites. Improperly installed, defective or low-quality BDA equipment can also generate strong RF noise on the outbound transmit frequencies used by 800 MHz voice radio systems, causing a “jamming” effect in areas close to the BDA<sup>4</sup>.

Under Section 90.219, the licensee need not obtain separate authorization for the use of signal boosters, but the licensee remains responsible for their operation, even if installed by others. While not stated directly, the necessary inference is that non-licensees must secure licensee permission to install and operate signal boosters. We believe that continuing this requirement of licensee permission is the best way to insure that boosters are “properly coordinated and installed.”<sup>5</sup> (NPRM, ¶ 79)

In any event, license-by-rule signal boosters designed for operation in spectrum adjacent to that used by Part 90 services must include sufficient high-quality band-pass and band-reject filtering to ensure that any RF noise generated by the license-by-rule device is effectively blocked prior to any antennas that are connected to the device, to eliminate the possibility that the device may interfere with Part 90 services.<sup>6</sup>

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<sup>4</sup> See the extended discussion of Fairfax County on this subject at Exhibit B. Our use of “Part 90” refers to public safety services, not private services that may be subscriber-based.

<sup>5</sup> Although the NPRM suggests that “completion of the rebanding process” might offer an opening for license-by-rule, we remain skeptical that public safety and commercial operations would be segregated enough in their respective post-rebanding deployments at 800 MHz to allow a safe departure from the practice of licensee advance authorization.

<sup>6</sup> In late June of 2011, George Fosque of Cambridge reported that “we have three carriers plus our city radio folks chasing what we believe to be a rogue BDA impacting certain of our trunked 800 channels.”

The details of interaction between a developer or building owner and the local public safety authorities can vary widely in the ways that codes and practices are written. The Cambridge Fire Department's extensive specifications<sup>7</sup>, for example, contrast with those of Arlington County, which leaves operational details "to the County Manager or his designee."<sup>8</sup> We doubt that these variations would require standardization under any rules the FCC might adopt. The NPRM properly does not "seek to preempt" (§ 96) the tailoring of local language to local needs.

**Confining Class B BDAs.** At least two of the licensees commenting here, Montgomery County and MWAA, have deployed fixed Class B BDAs in outdoor areas. The extended use of these along the Potomac River in Montgomery is described in Exhibit A. MWAA has placed two units at Dulles Airport. Neither licensee has received complaints about the operation of these broadband BDAs and each questions the need to limit their future public safety use to confined spaces. (NPRM, ¶ 78)

**MWAA's Supplemental Radiating System ("SRS").** The SRS extends both trunked and conventional service into the public terminals, private indoor facilities and multiple tunnels throughout both Airports. The SRS is the most unusual and complex system operated by MWAA. Entirely separate SRS's operate at Dulles and Reagan Washington National Airports. Collectively, the systems contain over 14 miles of radiating coaxial cable, 126 bi-directional amplifiers and 186 radiating antennas linking building interiors to the outdoor trunked radio system, which is otherwise non-functional inside the structures. While the Trunked and Conventional systems provide outdoor coverage at the airports and the route between them, the

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<sup>7</sup> [http://www.rfsolutions.com/Cambridge\\_MA.pdf](http://www.rfsolutions.com/Cambridge_MA.pdf)

<sup>8</sup> Exhibit A, Arlington Building Code, ¶ 71,

SRS provides the only effective radio coverage inside the critically important terminal buildings and other indoor facilities at both airports.<sup>9</sup>

The SRS uses many wideband/Class “B” boosters.<sup>10</sup> Besides critical indoor coverage, these boosters also provide over-the-air’ links between buildings, in the event other physical connections with the system are compromised.

Even a properly operating consumer booster presents public safety radio systems with technical issues, if the booster is operating near/under a public safety communications tower. Boosters communicating with a commercial carrier cell tower can and do increase the ‘noise floor’ of adjacent public safety spectrum as a normal course of operation and cause the public safety system radio receivers to be less sensitive. Trunked public safety communications systems are designed to recognize invalid transmissions (known as “illegal carriers”) and the public safety systems will automatically disable the channel /resource if illegal signals remain present for a set length of time (as configured by the radio system managers).

Temporary grandfathering is not the answer for services charged with saving lives and property in the long future. Instead, deployment of Class B BDAs in unconfined spaces should be presumed acceptable absent interference traceable to these units.

**Mobile BDAs.** However, mobile broadband BDAs present a different case. (NPRM, ¶ 81) Proper operation of Class B BDAs requires a certain amount of RF isolation between the donor antenna and the service antenna. Without sufficient RF isolation, Class B BDAs will loop

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<sup>9</sup> Apart from the dramatic and wide-ranging emergencies that can occur at airports generally, MWAA’s location in the Nation’s Capital presents daily requirements of special security for foreign nationals, diplomats and U.S. officials. Among the federal agencies regularly using the SRS are the Secret Service, the FBA and numerous agencies of the Department of Homeland Security.

<sup>10</sup> MWAA avoids Class A BDAs for reasons of “long group delay” discussed at ¶¶ 83-86 of the NPRM.

oscillate. Loop oscillation is, in essence, a state where the Class B BDA amplifies its own noise, quickly creating high levels of noise that may interfere with other systems and services operating in the design passband of the Class B BDA.<sup>11</sup>

The MWAA systems receive regular harmful interference from multiple moving sources. Much of the harmful interference is recurring, intermittent and sporadic – and is never identified after significant technical and expensive trace attempts. MWAA has hundreds of illegal carrier alarms demonstrating the extent of the problem. For these reasons and others, mobile use of broadband BDAs should not be permitted.

**Coordination.** We believe that private placement of BDAs or other repeaters at issue here should be coordinated with the respective licensees. We read Section 90.219 to require this for placement of devices on public safety frequencies. Confirmation of this obligation is more important than mandating any particular process. In turn, public safety licensees should be willing to coordinate with providers of wireless service to whom they might cause interference. However, the presumption must remain with the public safety licensee's freedom to place repeating devices wherever needed in support of their missions to protect lives and property. Should these placements cause interference, public safety licensees should be willing to work with the affected users to resolve the problem.

**Control.** While registration, monitoring and automatic shut-down of privately placed repeaters may prove feasible and useful, we don't believe these requirements should be applied to public safety devices at this time. In part, this arises from the presumption favoring public safety installations discussed under the Coordination heading above. Moreover, public safety

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<sup>11</sup> See expanded discussion at Exhibit B.

repeaters tend to be monitored in the natural course of carrying out the mission, and automatic shut-down could, in some cases, prove to be a cure worse than the disease.

**800 MHz Rebanding.** Some of the issues raised in the NPRM may be affected by the completion of the reconfiguration of this spectrum. However, that end date remains uncertain enough to recommend against writing anticipatory rules now. We believe it would be more prudent to regulate on the basis of the present state of shared use at 800 MHz.

Respectfully submitted,

PUBLIC SAFETY LICENSEES

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THEIR ATTORNEY

## EXHIBIT A

### **Anne Arundel County**

The County has BDAs installed at the Circuit Courthouse in Annapolis, Southern District Police in Edgewater, Western District Police in Severn, and the Regional Communications Center in Glen Burnie. These are all 800 MHz for the County's trunked radio system. We also have BDA's installed in the Regional Communications Center in Glen Burnie for VHF Fire paging, Verizon Wireless, Sprint Wireless, and Nextel Wireless.

In addition to the fixed BDA installations, the County has in deployment 85 FutureCom VRS units for enhancements to in-building communications.

### **Arlington County**

The County has installed 3 BDA's, broadband 800 MHz. They are installed in schools where the School Resource Officer works. They are crucial to the safety of the officer in the school. Additionally, an Arlington County Site Plan Condition requires new construction to have installed, at the developer's expense, a BDA if there are dead spots in the buildings or underground garages. To date, 8 buildings have had supplemental systems installed.

Arlington County, VA  
Building Code  
In- building Public Safety Communications

#### Paragraph 71

The developer agrees to install and maintain in an operable condition, in a manner acceptable to the County Manager or his designee, an internal antenna/amplifier system that permits public safety radio communications to transmit in the 806 – 824 MHz and to receive in the 851 – 870 MHz frequency from all areas within the building. The developer agrees to provide documentation in the approved electrical engineering drawings that adequate accommodations have been made in their building to meet this requirement.

(This code is invoked at the filing of a new construction permit)

### **Cambridge, Massachusetts**

BDAs: About 80 in Cambridge, most in private buildings (owned by building owners not the city), plus few in city buildings. They are mostly low power about 1/4 watt. The Fire Chief, under his authority, allows 800 MHz BDAs that cover city 800 frequencies in new buildings to be installed in lieu of “fire phones”. Thus most all new building owners install such BDAs as it's a win-win for everyone.

VRS. Have about 10 in fire vehicles, 15 watts output. Use when we go out-of-city into UHF communities. They are analog for now.

## Fairfax County

Fairfax County operates Class B BDAs at the following facilities:

- Buildings managed by the Fairfax County Office of the Sheriff, including the Fairfax County Courthouse, the Adult Detention Center and the Alternative Incarceration Branch (Pre-Release Center)
- The Public Safety and Transportation Operations Center ("PSTOC" 911 Center)

Additionally, Fairfax County has authorized the operation of BDAs on its public safety voice radio system by third parties, including BDAs operated by the City of Fairfax at Fairfax City Police Headquarters and Fairfax City Hall, and by the Fairfax County Public Schools at several large secondary school buildings, and, by the US Government at the new National Geospatial Agency in Newington.

Fairfax County also operates eight Futurecom VRS units.

All BDAs are used to provide reliable coverage inside buildings where coverage is otherwise unreliable. The VRS units are used as gateway devices to provide system access via NPSPAC National Mutual Aid channels to mutual aid responders who do not have actual system programming in their subscriber radios.

## Montgomery County

<u>Location</u>	<u>BDA Type/Class</u>
<b>Subways</b>	All are Class-B Indoors
White Flint	
Grosvenor	
Medical Center	
Bethesda	
Friendship	
Forest Glen	
Wheaton	
Glenmont	
<b>River</b>	All are Class-B Outdoors
Sangamore	
Madeira	
Riverbend	
Loudoun WTP	
<b>In-Buildings</b>	All are Class-B Indoors
Judicial Center	
MD Dist Court (Rt. 29)	

Holy Cross Hospital  
Suburban Hospital  
MC General Hospital  
Wash. Adventist Hospital  
Wisconsin Ave. Police Station  
Sligo Rd. Police Station  
MC Detention Center (4)

## **Second Wave Buildings/Malls**

All are Class-B Indoors

Courthouse 27  
Lakeforest Mall  
City Place Mall  
Montgomery Mall  
Wheaton Mall  
Homeland Security Dept.  
Town Square Garage  
Wayne Ave Garage

## **MC Correctional Facility**

All are Class-B Indoors

Main (2)  
Warehouse (1)

## **Large Buildings Known with BDAs (Considered Class-B)**

1. Wisconsin Place 5400 Wisconsin Ave. 3 bldgs....1 in garage below grade.....1 in 9 story...16 story residential
2. Chevy Chase Center 5425 Wisconsin Ave business and retail with below grade parking
3. Meridian 5230 Tuckerman Lane 15 story residential with 4 levels of below grade parking
4. United Therapeutics 1040 Spring St. 8 story business
5. Cameron House 18 story residential and 4 levels of below grade parking
6. Park Potomac Office tower 12505 Park Potomac Ave. 8 story business with below grade parking
7. North Bethesda Market 11218 Rockville Pike and 11351 Woodglenn Dr. Large mixed use complex 3 buildings with 5 levels of parking below grade, office retail and street level, and 2 residential high rise, 1 24 floors and 1 8 floors 1, 3 floors
8. Arlington East - Arlington Rd. below grade parking with street level mixed use and residential above. 6 stories Not high rise
9. Hilton Gardens Inn - Waverly St. 12 story hotel with below grade parking
10. Foxhill 8500 Burdette Rd. large residential non-high rise with below grade parking
11. 1200 East West Highway 12 story residential with parking below grade
12. 1200 Blair Mill Rd 10 story residential with below grade parking
13. Hampton Inn 8750 Colesville Rd. 10 story hotel with 1 level below grade
14. Portico 1203 Fidler La. 10 story residential with below grade parking
15. Opus 6720B Rockledge Dr. 8 story business use.
16. Lockheed Martin 6777 Rockledge Dr. 8 story business
17. 10001 New Hampshire Ave. 5 story business with 1 level of parking

18. Marriott Convention Center 5715 Marinelli Rd. phase 2 10 story hotel
19. Cresthaven Elementary School
20. Francis Scott Key Middle School
21. New Rockville city District Court
22. Medimune complex in Gaithersburg City

The following projects are under construction and will have BDAs installed:

1. NRC building 3 12400 blk Rockville Pike 18 story business with 4 parking levels below grade
2. Spencerville Academy Spencerville Rd. large education facility mostly above grade
3. The Galaxy Apts. 8025 13<sup>th</sup> St 5 floors residential with 3 parking levels below grade
4. Ripley 1 – 18 floors of residential with 4 below grade levels of parking
5. Ripley 2 - 18 floors of residential with 4 below grade levels of parking
6. National Cancer Institute Broshart Rd. 2-8 floor business buildings and 1 5 floor parking garage mostly above grade

Section 3110 of the County Building Code may be found at  
[http://www.rfsolutions.com/Montgomery\\_MD.pdf](http://www.rfsolutions.com/Montgomery_MD.pdf)

## **MWAA**

BDAs – All fixed, Class B (Wideband)

Reagan Washington National: Airport: 27

Dulles: 99

BDAs are installed in terminal buildings, parking garages, within the Dulles “Aerotrain” system and in all passage and utility tunnels at both airports to provide reliable radio coverage for public safety operations in locations that do not have adequate signal penetration from outdoor radio transmission facilities. Due to topography, two outdoor areas at Washington Dulles International Airport also require supplemental (fill-in) radio coverage provided by Class B bi-directional amplifiers. The wideband BDAs also provide a standby over-the-air link between the indoor and outdoor systems should the primary fiber-based connection be disrupted. This requires that the BDA links radiate (directionally) outside a controlled space.

## EXHIBIT B

### Extended comments of Fairfax County

#### **License by Rule**

Fairfax County is concerned that signal boosters placed into operation by private parties may create harmful interference to its two 800 MHz voice radio systems. Unless properly installed and maintained, BDAs can generate wideband RF noise that can cripple the inbound receive performance of 800 MHz voice radio systems, resulting in significant reduction of talk-in range for affected sites. Improperly installed, defective or low-quality BDA equipment can also generate strong RF noise on the outbound transmit frequencies used by 800 MHz voice radio systems, causing a "jamming" effect in areas close to the BDA.

800 MHz voice radio systems such as those used for public safety communications feature highly sensitive receive antenna system designs that include tower top amplifiers located just a few feet away from receive antennas located on towers and building roof tops, and distribution amplifiers located inside with receiver equipment. The net effect of these amplifiers is to essentially negate the passive losses created by antenna feedline, connectors, lightning arrestors, jumpers and splitters and other loss-prone passive devices between the receive antenna on the tower and receivers located inside of the site's equipment room. Accordingly, any signal energy present at the antenna is passed directly to receivers without attenuation from passive components, resulting in an extremely sensitive antenna system design that is able to receive very weak transmissions from low power portable radios operating inside buildings.

Because of the sensitive nature of these receive antenna system designs, even low levels of undesired RF energy (such as RF noise from an improperly installed, defective or low-quality BDA) can result in dramatic impacts to the receiver performance at an affected site. Finding the source of low level interference can be a difficult and costly process, especially if the locations of potential interference sources are not known.

In a "license by rule" regulatory framework, the County is concerned about the potential proliferation of low-cost, consumer grade BDA systems that could be placed virtually anywhere by persons without any background in the proper design and installation of BDA systems. Even though these consumer-grade BDA systems may not be specifically designed or intended to amplify the frequencies used by the County's 800 MHz voice radio networks, they may do so anyway, and may generate RF noise on the frequencies used by the County's 800 MHz voice radio networks. Absent any coordination or registration of license-by-rule BDA devices, the County is concerned about the impact that these devices may have on its 800 MHz voice radio networks, and the potential difficulties or impossibilities of locating a device should it be improperly installed or should it malfunction, causing interference to critical public safety communications.

If a license-by-rule framework nevertheless is adopted, the County suggests the following:

The license-by-rule framework should only apply to those frequency ranges used by commercial wireless networks. The current regulations should remain in force for BDAs designed to amplify frequencies in ranges used by public safety and other private networks (i.e., BDAs must be operated or authorized by a licensee).

License-by-rule BDAs designed for 800 MHz operation must include high quality filtering to block any RF energy on frequencies outside of those used by commercial wireless networks. Thus, the device should not be capable of passing any RF energy or noise on the post-rebanding 851-861 MHz and 806-816 MHz frequency ranges, to be used by the County and public safety generally.

### **Class B Mobile BDAs**

Class B BDA systems typically include a donor antenna that transfers signal energy to and from the macro network, and a service antenna that couples signal energy to handheld devices inside of a building, or in some cases, outdoors. Proper operation of Class B BDAs requires a certain amount of RF isolation between the donor antenna and the service antenna. Without sufficient RF isolation, Class B BDAs will loop oscillate. Loop oscillation is, in essence, a state where the Class B BDA amplifies its own noise, quickly creating high levels of noise that may interfere with other systems and services operating in the design passband of the Class B BDA.

Fairfax County believes that small operating environments such as vehicles provide limited options to achieving the amount of isolation required to prevent loop oscillation. The installation and operating environment for Class B BDAs in vehicles is dynamic, given that different types and sizes of vehicles will exhibit varying degrees of isolation between donor and service antennas, and, vehicles in motion are exposed to constantly changing environments in the macro network. Moving vehicles in these dynamic environments present ample opportunities for loop oscillation and interference to occur. One can only imagine the difficulty in locating a moving source of interference to a public safety network.

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